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Depopulation and Disorganization of Mountain Area Communities in Japan:

With Application of Factor Analysis

Hisayoshi Mitsuda
Bukkyo University

I. INTRODUCTION

During Japan's rapid economic development in the 1960's, a number of mountain area communities have been depopulated and disorganized. Simultaneously, this phenomenon has been associated with the depression in the economic sphere and with the worsened standard of living and welfare levels in these areas.

This problem of regional retardation has become an extremely serious obstacle not only to the daily life of the residents in such communities, but also to the general land development in Japan. The same problem has been indicated in the areas of the Alps in Europe, the Appalachian Mountains in the United States and the high lands in Scotland. Previous studies on depopulation can be divided into two different categories: those at the macro-level and those at the micro-level.

First, from the viewpoint of the national economy and national land use, the general structural factors of this depopulation problem, caused by drastic migration, are investigated by analyzing national or subnational census statistics and other data sources.

Second, at the micro-level, or from the viewpoint of the individual residents or communities, changes of the way of life, community structure, or the way of adjustment made by the communities are described in detail by means of specific field surveys and intensive interviews.

Then, to begin with, this paper intends to identify and examine this depopulation problem in Japan at the macro-level during the 1960's period of rapid economic development by means of a brief examination of its historical perspective. In particular, an empirical attempt is made to verify the structural factors found in the process of the above changes. The main method used in

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this analysis is the Principal Component Analysis method, using the data of 44 municipalities in Kyoto Prefecture, dating from 1960, 1965 and 1970.

Next, at the micro-level, this study also points out that sociological factors, especially the community structure and the community leaders, play a central role for rural development. This is done by means of a comparative analysis of community reorganization movements in three villages under similar natural and economic conditions.

Primary data, collected by the author in three different periods, i. e., in 1972, 1978 and 1981, in the three village communities serve as the main source of this analysis.

Field interviews with the heads of all 45 households in these villages and with some informants or officers in the surveyed area were carried out to investigate: (1)what inducements have led residents to migrate out of these areas, (2) how the community structure has changed in the process of the depopulation, (3) how a different structure of the social system, especially the community leadership structure, affects and determines the ways of adjustment for rural development efforts.

This paper is organized as follows. Section II discusses a brief historical perspective from the standpoint of the relationship between economic growth and the depopulation problem. In Section III, factors and inducements of migration from mountainous areas are presented and examined with the use of the Principal Component Analysis method. In addition, a comparative analysis of three case studies is briefly engaged in. The surveyed villages, namely, *Haiya*, *Sarari* and *Ashu* are located in the *Hokuso* Forest Zone in Kyoto Prefecture. The major findings from the field interviews will be presented, including the description of the basic characteristics of these community structures. The concluding section (Section IV) will summarize some salient findings of this study and some implications of the role of community leaders for rural development. Earlier papers by the same author present a slightly more detailed discussion with some statistical evidence. (*)

(*) H. Mitsuda (1976) "A Regional Planning for Depressed Areas", in *Journal of Rural Problems*, 12: 1, 18-25.

H. Mitsuda (1978) "Public Policy Needs of Households in a Depopulated Village", in *Journal of Rural Problems*, 14: 2, 15-21.

H. Mitsuda (1979)"MURA NO JICHI" (Autonomy in Rural Communities) in *Sonraku no Hendo to Byori: Kaso no mura no Jittai*, Ed. S. Masuda, Kakiuchi Shuppan, Tokyo, 253-297.

H. Mitsuda (1979) "Murazukuri to Riida ni kansuru Kenkyu" (Community Reorganization and Community Leaders) in *Chiikishakaigaku no Shomondai*, Ed. E. Yamaoka, Koyoshobo, Kyoto, 140-177.

II. HISTORICAL PERSPECTIVE: ECONOMIC GROWTH AND MOUNTAIN AREA PROBLEMS IN JAPAN

The purpose of this section is to clarify the historical process of the depopulation problem in relation to the rapid economic development in Japan.

From the 1960's to the 1970's the average growth rate of the Gross National Product was more than 10 percent per annum. This remarkable rapid economic development with the expansion especially of the non-agricultural sectors has radically changed the labor force structure. As the labor force has shifted from the primary sector to the secondary and tertiary sector, rural people, especially youngsters who graduated from school, used to leave immediately the countryside for the urban areas.

As a result, the ratio of municipalities where the decrease in population

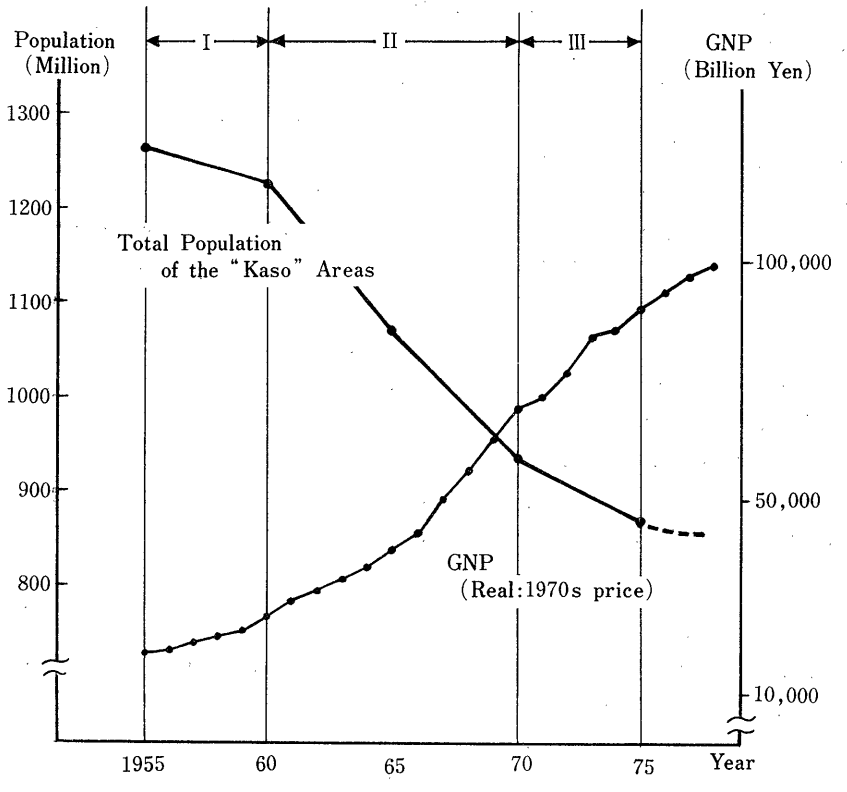


Figure 1. Depopulation and Gross National Product: 1955-78

reached more than 10 percent, has sharply increased first from 6.5 percent (227 out of 3280) in the 1955—60 period to 26.6 percent (897 out of 3376) in the 1960—65 period and then to 28.8 percent (938 out of 3330) in 1965—70. The trend of this rural depopulation was much more acute in remote and mountainous areas.

The rural depopulation in Japan may be divided into three periods (See Figure 1).

1) First Period: 1955—1960

Before 1960 the drastic population decrease was limited to the most isolated mountainous villages. At first, therefore, only a few mass media became aware of this problem of depopulation and appealed to the general public to understand the serious situation of the concerned villages.

Many agricultural and forestry researchers then interpreted this migration phenomenon as a reasonable labor force shift from the marginal zone. In other words, among them, little attention was paid to the problem at that time.

2) Second Period: 1960—1970

The expansion during the period of rapid economic growth in the 1960's accelerated the rural migration throughout Japan. Most of the municipalities located in mountainous areas suffered from serious problems associated with depopulation. These problems are divided into economic and social ones.

The economic problems include: (1) neglecting the efforts for forestry such as afforestation and reforestation, (2) difficulty in maintaining the basic agricultural infrastructure in the concerned communities, (3) the worsening quality of the labor force, i.e., the increasing ratio of the old, and also of women, in proportion to the total labor force. In addition, there are problems such as financial difficulties of the local government or the disorganization of the community decision-making structure.

In 1966, the Government of Japan for the first time referred to the above situation as the "Kaso-problem", in contrast to the "Kamitsu-problem"(*). Since that time, both national and local governments started to tackle with the "Kaso-problem" as an important policy target.

A number of agricultural and forestry researchers, journalists and government officials investigated the "Kaso-problem" in detail and proposed some policy programs to solve it.

3) Third period: 1970—1975

In 1970, the Japanese Diet agreed to establish the "Kaso-law" (the law about the "Kaso-problem" and its policy programs). In this law, the "Kaso-area" was defined as the municipalities where the population decrease was more than 10

(*) "Kaso" refers to the problems associated with rapid depopulation, "Kamitsu" to the problems associated with overpopulation.

percent during the five years period, from 1960 to 1965 and where the "Financial Capability Index"(*) was less than 0.4 on the average during 1966—68. Consequently, 23.7 percent of all municipalities (776 out of 3280) were classified as "Kaso-area" in 1970 (see Map 1).

The Government established the following four goals to solve the problem: (1) consolidation of public transportation, (2) raising the social welfare level, (3) promoting the development of industry, and (4) reorganizing village communities. In order to achieve these goals, the Government has invested at least a total of 7,926 billion Yen in "Kaso-areas" during the decade of the 1970's.

Since the establishment of the Law, the rate of rural depopulation has been slowing down. The 1975 Census reveals that only 13.6 percent of all municipalities (443 out of 3257) showed a decrease of more than 10 percent during the 1970—75 period. After the so-called oil crisis in 1978, the incentive for rural people to leave their villages has decreased, and some mountain area communities were even successful in stopping the migration or in increasing their population.

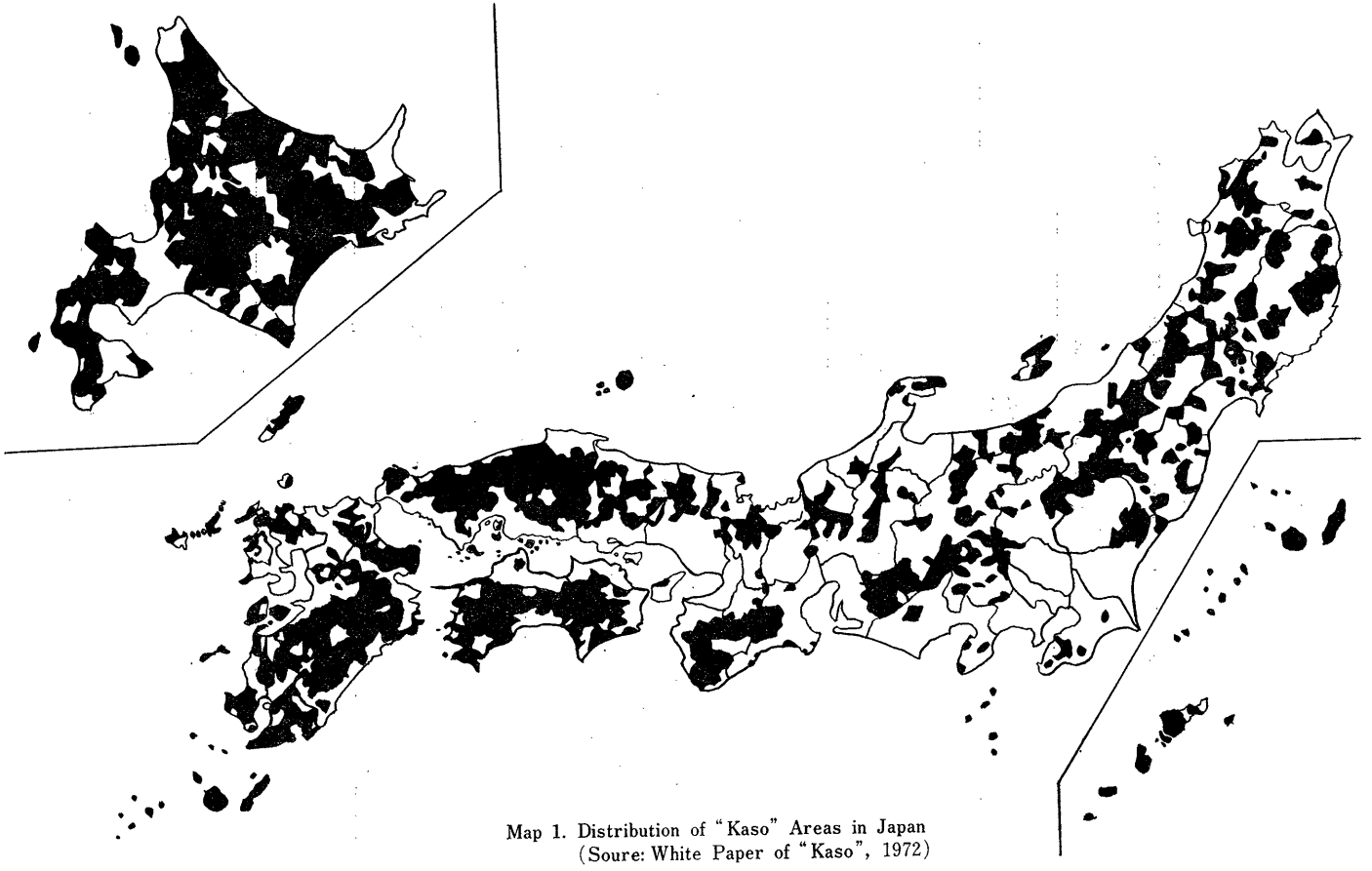
In summary, a number of reorganization movements have been attempted to solve the "Kaso-problem" throughout Japan. In spite of these efforts, however, the problems associated with depopulation have largely remained unsolved, especially in the most remote areas.

III. FACTOR ANALYSIS OF DEPOPULATION IN MOUNTAIN AREAS

This section will try to analyze the factors which would affect significantly depopulation in the mountain areas. The analysis is made in three steps: First, the factors of depopulation and community disorganization in those areas are explained theoretically. Second, the analysis at the municipality level, using the Principal Component Analysis method, intents to elucidate the above theoretical framework. Third, a comparative analysis at the village community level is undertaken to explain the changes of the life of the villagers and the community structures or the way of the reorganization movements in the process of depopulation. Intensive interviews were carried out with the heads of all households.

The above analysis in three steps has clarified the following points: (1) the relationship among the factors used in the analysis, (2) the regional distribution of the "Kaso-problem" and its changes during the decade 1960—1970, (3) the

(*) The "Financial Capability Index" is constituted by the total revenues divided by the necessary expenditures in the respective municipality.



Map 1. Distribution of "Kaso" Areas in Japan
(Soure: White Paper of "Kaso", 1972)

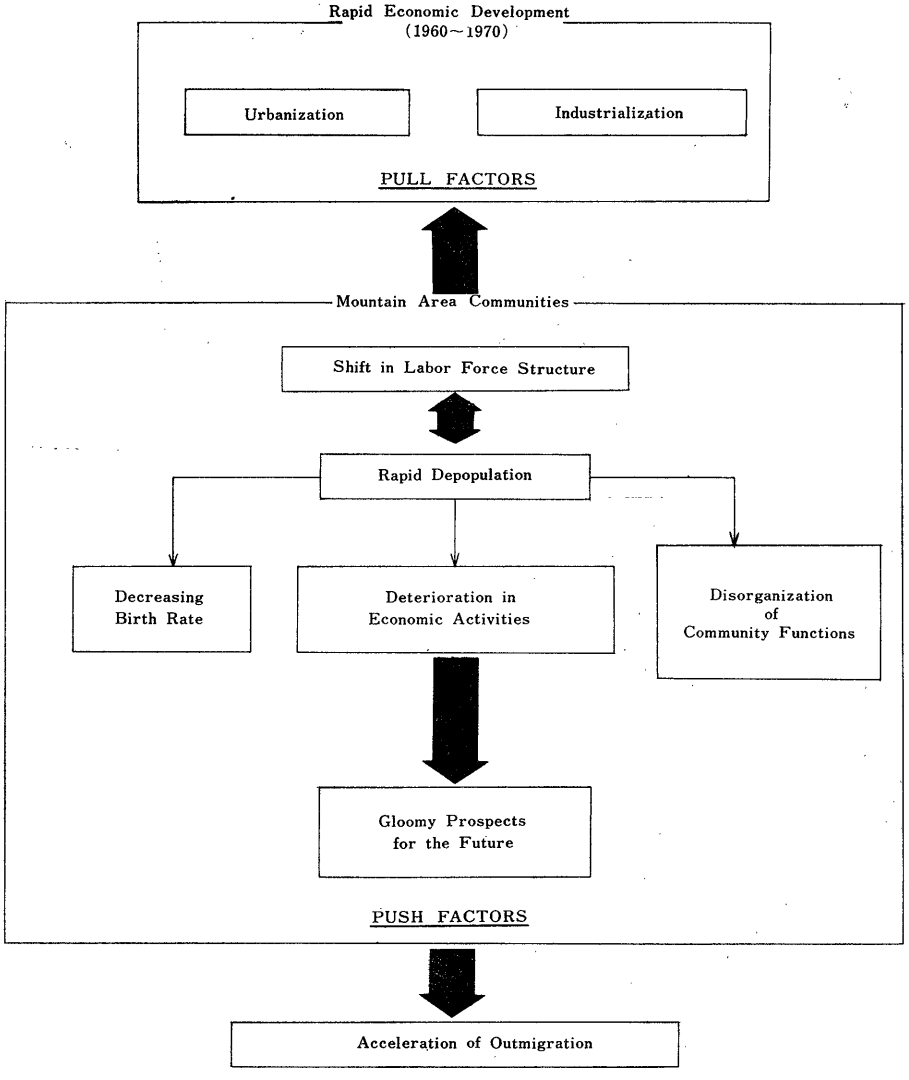


Figure 2. Process of Depopulation in Mountain Area Communities
—— The Push-Pull Theory ——

characteristics of the municipalities where the problems became more serious during 1960—1970, and (4) the implied roles of community leaders for rural development.

1. The Theoretical Framework

The inducements to move away from mountain areas can be divided into external factors (pull factors) and internal factors (push factors), as is shown in Figure 2.

The major pull factors are: (1) drastic change in the labor force structure during the period of rapid economic development, and (2) the urban-rural differences in income, opportunity to obtain jobs, also, the differences in the standard of living and welfare levels. These pull factors have been strengthened by the expansion of urbanization and industrialization during the 1960—1970 period.

The push factors may be further divided into economic, social, psychological and demographic factors.

Economic push factors are: (1) the retarded position of forestry due mainly to the "fuel revolution", (2) the low productivity of agriculture and the relatively poor agricultural infrastructure in the mountain areas, and (3) the impact of the increased imports of timber.

Until the early 1960's, charcoal-making and firewood-cutting has provided fair incomes to many mountain villagers. However, the "fuel revolution" took away the opportunity to be engaged in charcoal-making.

Farmlands in the mountain areas are usually very small and located on terraced fields. In addition, the agricultural infrastructure is so poor in any measurement that the net farm income in the mountain areas was only 66.8 percent of the national average in 1970.

Remoteness from urban employment opportunities has limited the gain from off-farm employment for the villagers. Most of them had to work as temporary workers, often with low wages.

Since the economic policy has shifted the importance of domestic and imported timber during the 1960's, the supply of imported timber in 1970 became about 6.6 times that of 1960. The rapidly increasing supply of imported timber has caused a severe damage to the domestic forestry. In particular, most of all small forestry farmers had to give up working on their forest land. Thus, the number of forest workers decreased from about 67,000 in 1960 to 37,000 in 1970.

The social push factors include: (1) the lack of social or welfare facilities, such as schools, hospitals and public transportation, and (2) the difficulty to maintain these community functions. Since the local government located in the above malfunctioning areas have always been in financial difficulties, they

could not completely provide the residents with the needed public services.

It is obvious that the residents, especially youngsters, lacked all prospects for the future in their own community, and thus they preferred to leave for the cities as soon as possible. This may be called the psychological push factor.

Beside these factors, the demographic factor should be added. The increase of the aged results in the decrease of the birth rate and of the population itself.

2. Factor Analysis of Depopulation: at Municipality Level

In order to test the above theoretical framework, 99 variables were picked up from each factor, using the data of 44 municipalities in Kyoto Prefecture dating from 1960, 1965 and 1970. Then 22 variables were selected according to the variable reduction procedure by two criteria: (1) dropping of identified variables where the correlation coefficient was 0.9 or higher, (2) dropping of variables where factor communalities were less than 0.5 .

The selected 22 variables are as follows:

V 1: Population density
V 2: Rate of population decrease
V 3: Ratio of the aged population of 65 and over versus the adult population aged 15 to 64
V 4: Ratio of the number of commuters versus the resident population
V 5: Percentage of workers in the primary industry
V 6: Productivity of labor
V 7: Productivity of land
V 8: Income per person
V 9: Percentage of income in the primary industry
V10: Percentage of blue-collar workers
V11: Percentage of farm household population
V12: Price of land for housing
V13: Ratio of farmland converted to non-farm uses
V14: Percentage of forestry households
V15: Percentage of forestland and fields
V16: Number and density of factories
V17: Medical facilities in the community
V18: Number of pupils per primary school teacher
V19: Percentage of paved roads
V20: Percentage of households with color television
V21: "Financial Capability Index"
V22: The amount of government investment

Then, using the Principal Component Analysis method, the primary factor

(Factor I) was extracted explaining 72.31 percent of the total variance of these 22 variables. Shown as Table 1, all of the 22 variables are strongly loaded by Factor I. That is, the variables V3, V13 (factor loading$>$0.9), V15, V10, V5, V2 ($>$0.8), V9, V14 ($>$0.7) are strongly associated with Factor I through factor loading of 0.74 and over. On the contrary, the variables V6, V7, V12, V22 (factor loading <-0.9), V21, V1, V8, V4, V13, V18 (<-0.8), V16, V20, V19, V17 (<-0.7) are negatively associated with Factor I through factor loading of -0.72 or less.

The former group of variables illustrates the typical characteristics found in depopulated rural areas, and the latter shows those found in urban areas of other areas with increasing population. Accordingly, Factor I may be called "Kaso-Indicator".

In order to clarify the relative distribution of, and its change in the depopulated and depressed areas during 1960—1970, the score of "Kaso-Indicator" was computed for each of the 44 municipalities in Kyoto Prefecture for the years of 1960, 1965 and 1970, as is shown in Table 2.

Map 2 shows the map of relative distribution of the above areas. Five

Table 1. Eigen Vectors and Factor Loadings

	Factor I $\lambda_1=15.908$ $P_r=72.31\%$	
Variables	Eigen Vectors	Factor Loadings
V 3 : The aged population	0.228	0.908
V 11 : Farm house hold population	0.227	0.904
V 14 : Forestry households	0.216	0.860
V 10 : Blue-collar workers	0.215	0.858
V 5 : Workers in the primary industry	0.214	0.854
V 2 : Population decrease	0.211	0.842
V 9 : Income in the primary industry	0.194	0.773
V 15 : Forestland and fields	0.185	0.741
V 6 : Productivity of labor	−0.243	−0.968
V 8 : Income per person	−0.232	−0.925
V 12 : Price of land	−0.230	−0.918
V 22 : Goverment Investment	−0.226	−0.902
V 21 : Financial Capacity Index	−0.221	−0.881
V 1 : Population densjty	−0.217	−0.866
V 7 : Productivity of land	−0.214	−0.855
V 4 : number of commuters	−0.214	−0.854
V 13 : Farmland converted	−0.214	−0.853
V 18 : Pupil per teacher	−0.214	−0.852
V 16 : Density of factories	−0.197	−0.786
V 20 : Households with colar TV	−0.197	−0.785
V 19 : Percentage of paved roads	−0.187	−0.746
V 17 : Medical facilities	−0.183	−0.728

Table 2. The Scores of "Kaso-Indicator"

		Scores		
		1960	1965	1970
Municipalities	1. Keihoku	0.969	2.248	2.739
	2. Miyama	1.895	4.419	4.527
	3. Hiyoshi	1.314	1.839	2.261
	4. Wachi	1.511	2.141	2.150
	5. Ohe	2.762	2.902	3.599
	6. Minami	2.643	1.562	3.031
	7. Watsuka	1.101	−0.136	1.259
	8. Yakuno	3.864	3.889	3.918
	9. Mizuho	3.916	3.745	3.535
	10. Ine	4.252	4.359	3.773
	11. Miwa	5.055	4.779	4.390
	12. Yasaka	2.752	1.947	2.032
	13. Tanba	1.379	1.494	0.799
	14. Kumihama	3.120	2.787	1.536

municipalities, colored black on the map (Keihoku-cho, Miyama-cho, Hiyoshi-cho, Wachi-cho and Ohe-cho), constitute the areas where the "Kaso-problem" has become more serious during 1960—1970. These municipalities are located in the Hokuso Forest Zone (Except Ohe-cho).

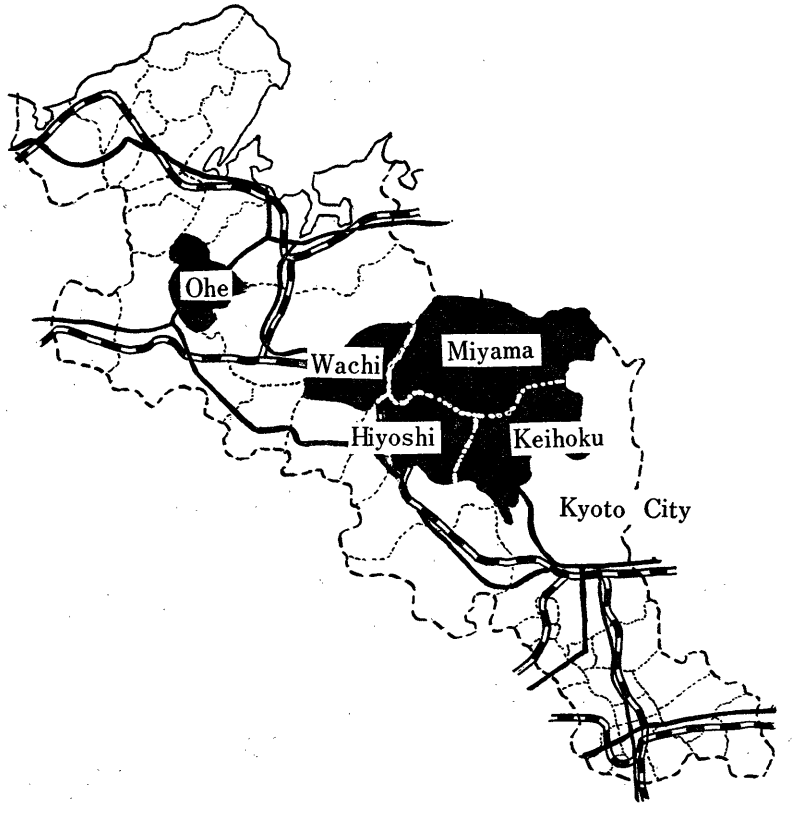
Next, computation was made of the weight of each variable versus the aggregate score of "Kaso-Indicator" in order to determine the top five variables among the 22 that affect more strongly the highest score of "Kaso-Indicator" in the above five municipalities.

The following five variables are identified by this analysis: (1) the lowest population density, (2) the lowest productivity of land, (3)the highest percentage of forestlands and fields, (4) the highest percentage of income in the primary industry. This result clearly indicates that the factors influencing the phenomenon of depopulation consist of various economic and demographic factors, but much less of social-psychological ones.

3. Comparison of Three Case Studies: at Community Level

The field survey was conducted in three village communities, namely, *Haiya*, *Sasari* and *Ashu* in 1972, 1978 and 1981 (See Map 3). These villages were selected mainly for the following two reasons.

First, they are characterized by the common and marked featuers found in the "Kaso-areas", i.e., (1) a small number of farm households, (2) the deteriorated economic conditions of agriculture and forestry, (3) the isolation and



Map 2. Distribution of Municipalities by "Kaso-Indicator"; 1960-70 in Kyoto Prefecture.

remoteness of urban areas, and (4) the self-contained socio-economic life.

Second, each community has a typical, different structure, especially in the leadership structure, which had, to a different degree, changed in the process of depopulation.

Next, a comparative analysis was carried out in order to examine how the community structure has changed in the process of depopulation, and how a different structure of social relationships, especially the community leadership structure, affects and determines the way of adjustments for rural development efforts. The following is a brief summary of this analysis.

(1) *Haiya*

Of the total population in 1960, 44 percent migrated during the decade 1960—1970. This was a drastic migration in which the leaders, who formerly constituted the socio-econmically upper class, were first to leave for the cities.

Due to the absence of these leaders, the remaining villagers were not able

Map 3. Map of kyoto Preferecture and the Surreved Villages: Haiya. Sasari and Ashu in Miyama-cho anc Keihoku-cho

to determine how to adjust to the rapid depopulation. Furthermore, the disorganization in community decision-making made their sense of solidarity weaker and weaker, and most of them eventually gave up making efforts for their rural reconstruction.

Consequently, the outmigration has continually accelerated. Today, about 40 percent of the remaining household heads, mostly the aged people, are out of work and have only gloomy prospects for the future.

(2) *Sasari*

Before 1960, Sasari was one of the richest villages of the Hokuso Forest Zone and the villagers were well off because of the community-owned productive forestland of over 1,500 hectares.

However, frequent heavy snow falls in 1963, 1975, and 1977 have caused and accelerated population decrease, which can be seen from the following population fluctuation: there were 180 persons in 1960, 119 in 1963, 197 in 1970, 98 in 1975, and finally 75 in 1977. The trend of this general population decrease is continuing.

In Sasari, the so-called fuel revolution has created a separation of the villagers between those who have and those who have not. Those who have gradually become more powerful and influential towards the others. One top leader, for example, controled every aspect of the decision-making processes in his village.

However, later on he failed in his business, and left the village. It seems presently difficult to determine the future direction and the organization of this village without his leadership. A polarization can be observed. Younger villagers under 40 are making efforts to construct a skiing ground. In contrast, the older villagers over 40 are willing to be engaged in forest work.

The interview survey reveals that; (1) only 6.3 percent of all household heads show the intention to leave; (2) about 50 percent are very willing to continue their present occupations; (3) the remaining 43.8 percent are the group who are somewhat reluctant but intend to continue their jobs; and (4) the highest percentage of the expected future occupation is forestry (51.2 percent of all household heads); the second highest is leisure-related occupations e.g., skiing management and river-fishing service (26.8 percent).

The future of this village seems to be that young people will take over the leadership of this village, through efforts for integration and reorganization. Forestry and leisure industry such as skiing will be the basis for this.

(3) *Ashu*

One of the characteristics of Ashu is that it has over 4,000 hectares forestland owned by Kyoto University. Until the early 1960's, most of the villagers

were engaged in charcoal-making, half of them as employees of Kyoto University. However, the so-called fuel revolution took away the opportunity to do so. After that, 39.5 percent of the total population in 1960 had migrated during 1960—70.

Three occupational groups are distinguished. The first group is the group of forest workers, which has decreased from 30.8 percent of all family heads in 1973 to 21.4 percent in 1981. They are the socio-economically lowest group. The second group is a group of the employees of Kyoto University, who receive the highest family income. The third group is one of mushroom-growers, who count 23.8 percent of all families.

Mushroom production was tried as one of the community projects to solve the depopulation problem in this village. Though all villagers and the local government supported it strongly, it was impossible to make a living by it. But in 1969 three family heads, who were cousins, became determined to specialize in growing mushrooms. Their gross sales have been increasing year by year and the amount sold in 1978 was over 80 million Yen.

The survey shows that 80.0 percent of all the family heads regard these three men as the leaders of this village. Owing to the success of this community project, these three men have taken initiatives in the integration of public profits and intentions of the villagers. In the future, they probably will have substantial power and control with respect to the decision-making processes of the village reconstruction.

IV. CONCLUSION

Based on the preceding findings of this study, a set of brief conclusions will be summarized as following:

1) The Macro-level
   (1) The rapid economic development of Japan has accelerated the outmigration of the rural population radically, in particular from the remote and mountainous areas in the 1960's.
   (2) Since the 1970's, especially after the oil crisis of 1973, outmigration from rural areas has slowed down or the movement has even been reversed in some areas.
   (3) Factors found in the process of depopulation in mountain areas are complex, including economic, social, psychological and demographic ones.
2) The Micro-level
   (1) The sociological factors, such as community structure or community leaders play a central role for rural development.
   (2) A policy implication of this study is that of the importance of the human

capital and organizational factors for the purpose of rural reconstruction in depopulated areas, a point which has very often been overlooked by policy makers or researchers.